



# PUBLIC NOTICE

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## THE COMMISSION SEEKS TO UPDATE AND REFRESH THE RECORD IN THE “UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES IN THE 5 GHz BAND” PROCEEDING

ET Docket No. 13-49

**Comment Date: [30 days after date of publication in the Federal Register]**

**Reply Comment Date: [45 days after date of publications in the Federal Register]**

By this Public Notice, the Commission invites interested parties to update and refresh the record on the status of potential sharing solutions between proposed Unlicensed National Information Infrastructure (U-NII) devices and Dedicated Short Range Communications (DSRC) operations in the 5.850-5.925 GHz (U-NII-4) band. U-NII devices provide short-range, high-speed unlicensed wireless connections in the 5 GHz band for, among other applications, Wi-Fi-enabled radio local networks, cordless telephones, and fixed outdoor broadband transceivers used by wireless internet providers.<sup>1</sup> DSRC uses short-range wireless communication links to facilitate information transfer between appropriately-equipped vehicles and appropriately-equipped roadside systems (“vehicle to infrastructure” or “V2I”) and between appropriately-equipped vehicles (“vehicle to vehicle” or “V2V”).<sup>2</sup>

In this Public Notice, we are building on efforts to date by the Commission, the Department of Transportation (DoT), and the automotive and communications industries to evaluate potential sharing techniques. In August 2015, the DoT released a DSRC-Unlicensed Device Test Plan that described tests to characterize the existing radio frequency signal environment and identify the impacts to DSRC operations if unlicensed devices operate in the 5.850-5.925 GHz band.<sup>3</sup> As suggested by two Congressional letters received in September 2015,<sup>4</sup> the Commission is now seeking to refresh the record

<sup>1</sup> See 47 CFR pt. 15 subpart E – Unlicensed National Information Infrastructure Devices. Part 15 of the Commission’s rules permits the operation of radio frequency devices without issuing individual licenses to operators of these devices. We are using the Commission-designated sequential numbers to identify the U-NII 5 GHz band segments. *Revision of Part 15 of the Commission’s Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, ET Docket No. 13-49, Notice of Proposed Rulemaking, 28 FCC Rcd 1769, 1771 n.5 (2013) (*NPRM*).

<sup>2</sup> *NPRM*, 28 FCC Rcd at 1797, para. 93.

<sup>3</sup> <http://www.nhtsa.gov/Vehicle+Safety/dot-dsrc-testplan> (DoT Test Plan).

<sup>4</sup> Letter from Senators John Thune, Cory A. Booker, and Marco Rubio to Anthony Foxx, Secretary, U.S. Department of Transportation, Penny Pritzker, Secretary, U.S. Department of Commerce, and Tom Wheeler, Chairman, FCC (September 9, 2015); Letter from Senators Bill Nelson, Claire McCaskill, and Gary C. Peters to Anthony Foxx, Secretary, U.S. Department of Transportation, Penny Pritzker, Secretary, U.S. Department of Commerce, and Tom Wheeler, Chairman, FCC (September 10, 2015) (attaching Letter from Alliance of Automobile Manufacturers, Association of Global Automakers, Intelsat, National Cable & Telecommunications Association, Qualcomm, and SES to Anthony Foxx, Secretary, U.S. Department of Transportation, Penny Pritzker, Secretary, U.S. Department of Commerce, and Tom Wheeler, Chairman, FCC (September 9, 2015)). Briefly, the letters call for the FCC, in coordination with DoT and NTIA, to ensure that the requisite testing and modelling is conducted so  
(continued....)

of its pending 5.9 GHz rulemaking proceeding to provide interested stakeholders the opportunity to provide further comment on sharing in the band. We also solicit the submittal of prototype unlicensed, interference-avoiding devices for testing, and seek comment on a proposed FCC test plan to evaluate electromagnetic compatibility of unlicensed devices and DSRC.

### **The U-NII Bandplan**

Primary among the considerations in establishing rules for U-NII was to make broadband technologies available in the 5 GHz bands, while protecting authorized Federal and non-Federal users of the bands from harmful interference.<sup>5</sup>

In various proceedings since 1996, the Commission established the following bandplan for U-NII in the 5 GHz band:

- The *Report and Order* in ET Docket No. 96-102 made the 5.15-5.25 GHz (U-NII-1), 5.25-5.35 GHz (U-NII-2A), and 5.725-5.825 GHz (U-NII-3) bands available for U-NII.<sup>6</sup>
- The *Report and Order* in ET Docket 01-122 made the 5.47-5.725 GHz (U-NII-2C) band available for U-NII.<sup>7</sup>
- The *Notice of Proposed Rulemaking* in ET Docket No. 13-49 sought comment on modifying U-NII devices' technical requirements to further ensure that U-NII devices not cause harmful interference to authorized users of the relevant bands,<sup>8</sup> and making additional 5 GHz band spectrum available for U-NII use: 5.350-5.470 GHz (U-NII-2B), 5.725-5.850 GHz (expansion of the U-NII-3 block), and 5.850-5.925 GHz (U-NII-4).<sup>9</sup>
- The *First Report & Order* in ET Docket No. 13-49 revised the technical rules for the U-NII devices,<sup>10</sup> and extended the upper edge of the U-NII-3 band from 5.825 GHz to 5.850 GHz.<sup>11</sup> However, the *First Report & Order* did not address the U-NII-2B and U-NII-4 bands, due to ongoing technical analysis at the time it was adopted.<sup>12</sup>

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the government has all the information it needs to determine how best to proceed in terms of interference avoidance and allocation of spectrum rights. The letters state that DoT is to take the lead, in coordination with FCC and NTIA, on development of the transportation technology, vehicle safety and capabilities testing.

<sup>5</sup> *NPRM*, 28 FCC Rcd at 1770, para. 1.

<sup>6</sup> *Amendment of the Commission's Rules to Provide for Operation of Unlicensed NII Devices in the 5 GHz Frequency Range*, ET Docket No. 96-102, Report and Order, 12 FCC Rcd 1576 (1997).

<sup>7</sup> *Revision of Parts 2 and 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) devices in the 5 GHz Band*, ET Docket No. 03-122, Report and Order, 18 FCC Rcd 24484 (2003) (*U-NII-2C Report and Order*).

<sup>8</sup> *NPRM*, 28 FCC Rcd at 1776-93, paras. 23-74.

<sup>9</sup> *NPRM*, 28 FCC Rcd at 1779, para. 29; *id.* at 1793-1802, paras. 75-112.

<sup>10</sup> *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, ET Docket No. 13-49, First Report and Order, 29 FCC Rcd 4127 (2014) (*First Report and Order*).

<sup>11</sup> *First Report and Order*, 29 FCC Rcd at 4153-54, paras. 91-94, *recon. denied*, *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, ET Docket No. 13-49, Memorandum Opinion and Order, FCC 16-24 at 7-9, paras. 17-23 (Mar. 2, 2016).

<sup>12</sup> *First Report and Order*, 29 FCC Rcd at 4130, para. 10. Implementing U-NII devices in the 5.35-5.47 GHz (U-NII-2B) band will be addressed in a future phase of this proceeding.

As a visual summary, this is the current status of the 5 GHz U-NII bandplan:

<b>U-NII-1 (100 MHz)</b>	<b>U-NII-2A (100 MHz)</b>	<b>Future phase of this Proceeding U-NII-2B (120 MHz)</b>	<b>U-NII-2C (255 MHz)</b>	<b>U-NII-3 (125 MHz)</b>	<b>Subject of this Public Notice U-NII-4 (75 MHz)</b>
<b>5.150GHz</b>	<b>5.250GHz</b>	<b>5.350GHz</b>	<b>5.470GHz</b>	<b>5.725GHz</b>	<b>5.850GHz 5.925GHz</b>

### Incumbent Allocations and Services in the 5.850-5.925 GHz Band

The 5.850-5.925 GHz band is allocated on a primary basis to the Mobile and Fixed Satellite Services for non-Federal operations, and to the Radiolocation Service for Federal operations. This band is also allocated on a secondary basis to the Amateur Service.<sup>13</sup>

*Mobile Service.* The non-Federal Mobile Service operating on a primary basis in the 5.850-5.925 GHz band is limited to DSRC systems, a component of the Intelligent Transportation System (ITS) radio service.<sup>14</sup> In 1999, the Commission designated the 5.850-5.925 GHz band for DSRC-based ITS applications and adopted basic technical rules for DSRC operations.<sup>15</sup> In 2004, the Commission established licensing and service rules for DSRC in the 5.850-5.925 GHz band.<sup>16</sup> The DSRC Road Side Units (RSUs) are authorized under Part 90 (Subpart M) of the Commission's rules,<sup>17</sup> and the DSRC On-Board Units (OBUs) are authorized under Part 95 (Subpart L) of the Commission's rules.<sup>18</sup>

<sup>13</sup> See 47 CFR § 2.106 Table of Frequency Allocations.

<sup>14</sup> See 47 CFR § 2.106 footnote NG160. ITS is defined as:

The development or application of electronics, communications, or information processing (including advanced traffic management systems, commercial vehicle operations, advanced traveler information systems, commercial and advanced vehicle control systems, advanced public transportation systems, satellite vehicle tracking systems, and advanced vehicle communications systems) used singly or in combination to improve the efficiency and safety of surface transportation systems.

Section 6059 of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), Pub. L. No. 102-240, 105 Stat. 1914 (1991). ISTEA established a national program within the U.S. Department of Transportation (DoT) to develop ITS within the United States. ISTEA § 6051.

<sup>15</sup> *Amendment of Parts 2 and 90 of the Commission's Rules to Allocate the 5.850-5.925 GHz Band to the Mobile Service for Dedicated Short Range Communications of Intelligent Transportation Services*, ET Docket No. 98-95, Report and Order, 14 FCC Rcd 18221 (1999).

<sup>16</sup> *Amendment of the Commission's Rules Regarding Dedicated Short-Range Communication Services in the 5.850-5.925 GHz Band (5.9 GHz Band)*, WT Docket No. 01-90; *Amendment of Parts 2 and 90 of the Commission's Rules to Allocate the 5.850-5.925 GHz Band to the Mobile Service for Dedicated Short Range Communications of Intelligent Transportation Services*, ET Docket No. 98-95, Report and Order, 19 FCC Rcd 2458 (2004) (*DSRC Report and Order*).

<sup>17</sup> 47 CFR §§ 90.371-.383. An RSU is a stationary DSRC transceiver that is mounted along a road or pedestrian passageway, or on a vehicle or hand carried while stationary. An RSU is restricted to the location where it is licensed to operate, and broadcasts data to OBUs or exchanges data with OBUs in its communications zone.

<sup>18</sup> 47 CFR §§ 95.1501-.1511. An OBU is a DSRC transceiver that is normally mounted in or on a vehicle (though in some instances may be a portable unit). An OBU can be operational while a vehicle or person is either mobile or stationary.

*Fixed Satellite Service (FSS).* The non-Federal FSS operating on a primary basis in the 5.850-5.925 GHz band provides uplinks (Earth to space) in the “extended C-band” and is limited to international inter-continental communications, subject to case-by-case electromagnetic compatibility analysis.<sup>19</sup> FSS is widely used to provide a variety of commercial services domestically and internationally.<sup>20</sup>

*Radiolocation Service.* The Federal Radiolocation services operating on a primary basis in the 5.850-5.925 GHz band are radar systems used by various agencies including the Department of Defense (DoD).<sup>21</sup> The radar systems can be either mobile or transportable, and are used for surveillance, tracking and test range purposes.<sup>22</sup>

*Amateur Radio.* Amateur service stations are permitted to transmit in the 5.850-5.925 GHz frequency band on a secondary basis. Amateur stations transmitting in this frequency band must not cause harmful interference to, and must accept interference from, stations authorized by the Commission and other nations in the mobile and fixed satellite services, and also stations authorized by other nations in the fixed service.<sup>23</sup>

### **DSRC Band Plan**

The DSRC spectrum at 5.850-5.925 GHz consists of seven 10 megahertz wide channels and a 5 megahertz segment of spectrum reserved to accommodate future, unforeseen developments.<sup>24</sup> The FCC rules designate two of the seven 10 megahertz channels (5.855-5.865 GHz and 5.915-5.925 GHz) for safety of life and property applications and one of the 10 megahertz channels (5.885-5.895 GHz) is designated as a control channel. Two sets of the 10 megahertz channels may be combined to create a two 20 megahertz channel (5.865-5.885 GHz and 5.895-5.915 GHz).<sup>25</sup> The bandplan is shown below:

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<sup>19</sup> See 47 CFR § 2.106 footnote US245. See also 47 CFR § 2.108. FSS in the “C-band” is divided into heavily-used “conventional” segments (3.7-4.2 GHz downlink and 5.925-6.425 GHz uplink) and the lightly-used “extended” segments (3.6-3.7 GHz downlink and 5.850-5.925 GHz and 6.425-7.075 GHz uplink). See generally 47 CFR pt. 25 (regulation of Satellite Communications). The FSS provides communication between one or more satellites and earth stations at given (“fixed”) positions. 47 CFR § 25.103.

<sup>20</sup> For example, the FSS supports video distribution both on point-to-point and point-to-multipoint bases. The FSS also provides network services consisting of “backbone” capacity for point-to-point trunking for voice, data or Internet traffic; backhaul of communications services; and redundancy and restoration of communications services when other primary technologies fail. Further, the FSS is used to provide corporate, government, and military voice and data communications, as well as broadband and video services directly to the home.

<sup>21</sup> See 47 CFR § 2.106 footnote G2. The National Telecommunications and Information Administration (NTIA) reports that the National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration, and the Department of Energy also operate radar systems in the 5.850-5.925 GHz band. Department of Commerce, Evaluation of the 5350-5470 MHz and 5850-5925 MHz Bands Pursuant to Section 6406(b) of the Middle Class Tax Relief and Job Creation Act of 2012 at 5-2 to 5-3 (2013), [http://www.ntia.doc.gov/files/ntia/publications/ntia\\_5\\_ghz\\_report\\_01-25-2013.pdf](http://www.ntia.doc.gov/files/ntia/publications/ntia_5_ghz_report_01-25-2013.pdf) (NTIA 5 GHz Report).

<sup>22</sup> NTIA 5 GHz Report at 5-2.

<sup>23</sup> See 47 CFR § 97.303(r)(2).

<sup>24</sup> 47 CFR § 90.377; *DSRC Report and Order*, 19 FCC Rcd at 2472-74, paras. 27-29.

<sup>25</sup> 47 CFR § 90.377 nn. 2-4.

5.850	5.855	5.865	5.875	5.885	5.895	5.905	5.915	5.925
170 Reserved	172 Public Safety	174 Service Channel	176 Service Channel	178 Control Channel	180 Service Channel	182 Service Channel	184 Public Safety	
		175 Service Channel			181 Service Channel			

### U-NII-4 in the NPRM

In the *NPRM*, the Commission explored the potential for future unlicensed operations in, *inter alia*, the 5.850-5.925 GHz (U-NII-4) band, with the goal of promoting efficient use of the band through sharing spectrum with the incumbent operations.<sup>26</sup> The Commission sought comment on the technical requirements and sharing technologies and techniques that could be used by unlicensed users to protect incumbent operations.<sup>27</sup> The Commission also sought comment on the underlying assumptions and risk assessments in the NTIA 5 GHz Report (prepared in consultation with impacted Federal agencies, and released in 2013) that evaluates spectrum-sharing technologies in the U-NII-4 band.<sup>28</sup> The technical requirements for U-NII devices operating in the U-NII-4 band will depend ultimately on a determination of the types of unlicensed operations that can be supported while maintaining interference protection to incumbent Federal and non-Federal users. In the *NPRM*, the Commission stated that it believed that because the types of incumbent services across the 5 GHz spectrum share similar characteristics, the technical requirements for unlicensed devices also could share similar characteristics.<sup>29</sup>

In comments on the *NPRM*'s proposal to add unlicensed operations in the U-NII-4 band, the automobile industry<sup>30</sup> and NTIA on behalf of DoT<sup>31</sup> raised potential interference concerns with respect to protecting DSRC. In response to these concerns, in August 2013, the Regulatory Standing Committee of IEEE 802.11 formed "the DSRC Coexistence Tiger Team" to investigate potential mitigation techniques that might enable sharing between the proposed U-NII devices and DSRC equipment.<sup>32</sup> The IEEE Tiger Team completed its work March 2015, stating that it was unable to reach a consensus on either of two proposed sharing methods, but instead submitted that further analyses and testing could follow for both methods.<sup>33</sup>

<sup>26</sup> *NPRM*, 28 FCC Rcd at 1793, paras. 75-77

<sup>27</sup> *NPRM*, 28 FCC Rcd at 1793-94, 1796-98, 1798-800, paras. 78-81, 88-95, 97-101.

<sup>28</sup> *NPRM*, 28 FCC Rcd at 1800-01, 1802, paras. 102-08, 112.

<sup>29</sup> *NPRM*, 28 FCC Rcd at 1798, para. 95.

<sup>30</sup> The Alliance of Automobile Manufacturers, Inc. and the Association of Global Automakers, Inc. Comments at 22-31.

<sup>31</sup> Letter from Karl. B. Nebbia, Associate Administrator, Office of Spectrum Management, National Telecommunications and Information Administration, to Julius Knapp, Chief, Office of Engineering and Technology, FCC, ET Docket No. 13-49 (June 10, 2013), forwarding Letter from John D. Porcari, Deputy Secretary of Transportation, Department of Transportation, to Lawrence E. Strickling, Assistant Secretary for Communications and Information, U.S. Department of Commerce (May 16, 2013).

<sup>32</sup> IEEE 802.11-15/0347r0, Final Report of DSRC Coexistence Tiger Team at 1 (Mar. 9, 2015) (Tiger Team Final Report), <https://mentor.ieee.org/802.11/dcn/15/11-15-0347-00-0reg-final-report-of-dsrc-coexistence-tiger-team-clean.pdf>. Originally a military term, the term "Tiger Team" has evolved from an espionage focus to the more recent problem solving orientation.

<sup>33</sup> Tiger Team Final Report at 18. *See also* Letter from Paul Nikolich, IEEE 802 LAN/MAN Standards Committee Chairman, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 13-49 (May 12, 2015).

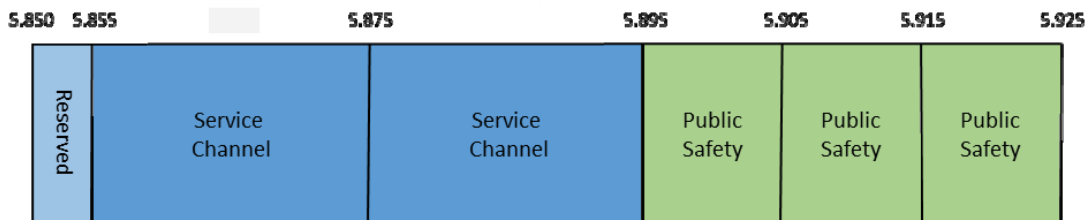
## Updating and Refreshing the Record

The IEEE Tiger Team examined two proposed sharing techniques. The “detect and avoid” approach involves detecting the presence of DSRC signals, and avoiding using the spectrum in this band when DSRC signals are present.<sup>34</sup> The “re-channelization” approach involves moving all safety-related DSRC communications to the upper part of the band, and permitting unlicensed devices to share the lower part of the band with non-safety DSRC communications.<sup>35</sup>

*Detect and avoid.* Under this sharing proposal, unlicensed devices would monitor the existing 10 megahertz-wide DSRC channels established in the *DSRC Report and Order*.<sup>36</sup> If an unlicensed device detects any transmitted DSRC signal, it would avoid using the entire DSRC band to assure no interference occurs to DSRC communications.<sup>37</sup> After waiting a certain amount of time the unlicensed device would again sense the DSRC spectrum to determine if any DSRC channels are in use or whether it could safely transmit.<sup>38</sup>

*Re-Channelization.* Under this sharing proposal, the DSRC spectrum would be split into two contiguous blocks: one for safety-related communications and one for non-safety-related communications. This would be accomplished by moving the control channel and the two public safety channels to the top portion of the band. Additionally, the remaining four DSRC service channels would be reconfigured at the lower end of the band as two 20 megahertz channels rather than maintaining four 10 megahertz channels.

The bandplan for the re-channelization sharing proposal is shown below:<sup>39</sup>



<sup>34</sup> Tiger Team Final Report at 6-7. *See also* Cisco Systems Inc. Reply at 24-28; Letter from Mary L. Brown, Senior Director, Government Affairs, Cisco Systems, Inc. to Marlene H. Dorch, Secretary, FCC (Dec. 23, 2015).

<sup>35</sup> Tiger Team Final Report at 7-8. *See also* Qualcomm Inc. Comments at 5-17 (Qualcomm Comments).

<sup>36</sup> *DSRC Report and Order*, 19 FCC Rcd 2458.

<sup>37</sup> Under this sharing proposal, the unlicensed device avoids using the entire DSRC spectrum even if only a single DSRC channel is occupied. Implementing such an avoidance technique recognizes the disparity between the 10 megahertz wide DSRC channels and the wider channels specified in the various 802.11 protocols. For example, the 802.11ac standard specifies bandwidths of 20, 40, 80, and 160 megahertz in the 5 GHz band. Thus, an 802.11 transmission would overlap multiple DSRC channels.

<sup>38</sup> Conceptually, the “detect and avoid” proposal is similar to Dynamic Frequency Selection (DFS), a feature that the Commission requires devices operating in the U-NII-2A and U-NII-2C bands (5.250-5.350 GHz and 5.470-5.725 GHz) to employ. DFS dynamically instructs a transmitter to switch to another channel whenever a particular condition (such as, for example, the prevailing ambient interference level on a channel) is met. Prior to initiating a transmission, a device’s DFS mechanism would monitor the available spectrum in which it could operate. If a signal is detected, the channel associated with the detected signal would either be vacated and/or flagged as unavailable for use by the DFS device. *U-NII-2C Report and Order*, 18 FCC Rcd at 24495, para. 22. As the Commission has stated, “DFS is a key element in enabling unlicensed U-NII devices to share spectrum. . . .” *Id.* at 24497, para. 29.

<sup>39</sup> The control channel would be preserved as one of the public safety channels under this re-channelization option.



The segments designated for safety-related communications would remain exclusive to DSRC and the remaining spectrum would be shared between the DSRC service channels and unlicensed devices. Under this approach, sharing between unlicensed devices and non-safety DSRC would occur according to the sharing protocols used by standard 802.11 devices, *i.e.*, the device would listen for an “open” channel in the 5.850-5.895 GHz band and transmit if available. Otherwise the device would wait a very short period of time, and then try again.<sup>40</sup>

As described above, each proposed sharing approach relies on a different mechanism to avoid co-channel operations when DSRC channels are in use at a given location. We now seek comment on the merits of these two approaches. What are the benefits and drawbacks of each approach? Would one approach be better than the other (*e.g.*, minimize the risks of interference to DSRC more effectively while providing a comparable degree of meaningful access to spectrum for unlicensed devices)? For either approach, is it necessary for the Commission to specify all the details of the interference avoidance mechanism in the FCC rules or can this be addressed by relying primarily on industry standards bodies to develop the specific sharing methods? If the former, what specific technical details need to be specified in the FCC rules (*e.g.*, out of band emissions, noise tolerance, detection threshold, channel vacate time, etc.)? Has industry agreed upon performance indicators for DSRC, and if so, what are these metrics and is there a process to hold products to these performance levels?

We also seek comment on how the choice of avoidance protocol affects the deployment and performance of DSRC. Would “re-channelization” require any change in the design of the DSRC electronic components contained in DSRC prototypes or just require a change in the processing of the data? We seek comment on whether changing the channel plan would require re-testing of DSRC and, if so, precisely what would need to be done, why, and in what timeframe? Commenters responding to this question should provide specific information about why the completed tests are not applicable to re-channelization, how any new tests will differ from those already performed, and the relevant timeframes for completing these specific tasks.

Further, any testing, studies or analyses that have been performed regarding DSRC capabilities, Wi-Fi performance, interference studies or the potential benefits or drawbacks of sharing, which are relied upon by stakeholders in this proceeding, either in the past or going forward, need to be filed in the record to be considered. Additionally, has any testing been done regarding DSRC self-interference or potential harmful interference with satellite and government co-channel or adjacent users? Any such information filed should include the test plans, results, and underlying data needed to fully evaluate the submission. If there are data or reports that are not public, parties should describe the data and reports and explain why it is necessary to submit this information confidentially.

We also seek comment on what DSRC-related use cases should be expected and permitted in this band. Commenters should provide specific information regarding what DSRC applications are anticipated, what are the projected spectrum needs for each application, and how would the commenter classify each (*i.e.*, safety, non-safety, time critical or not)? Should the DSRC offerings provided on a priority or exclusive basis be restricted to safety-of-life or crash avoidance purposes? What are the technical or policy reasons for differentiating between safety-of-life and non-safety-of-life applications? Are there meaningful distinctions between DSRC applications that are safety-related and those that are not, such as applications that are time critical? For parties that advocate for re-channelization, is there a natural bifurcation point if we decide to separate safety-related and non-safety-related DSRC? For instance, while entertainment, social media, maps, and parking applications are not safety-related, what is a good definition for a feature or service to be considered truly a safety-of-life use? How does our current band plan and these sharing approaches match up with international efforts for safety-related DSRC systems?

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<sup>40</sup> Tiger Team Final Report at 7-8. *See also* Qualcomm Comments at 5-17.

To help us fully evaluate the potential effects of re-channelization, please provide the projected timeframe for introduction of DSRC deployments under the current channel plan. What market penetration (*e.g.*, percentage of cars on the road) is needed for DSRC to reliably provide safety-of-life functions or prevent vehicle-to-vehicle collisions? What are the projected timeframes for achieving the penetration levels needed for each safety-of-life or crash avoidance function to be effective? Will these penetration levels be met by equipment that is native to the automobile or through standalone or retrofit devices? Would these timeframes change if re-channelization occurs and by how much? In the meantime, what other spectrum bands, driver-assist technologies, and commercial offerings are providing similar services to those envisioned using DSRC? Is it possible that autonomous car and other technologies could bypass DSRC safety-of-life capabilities prior to reaching a sufficient technology penetration to make this service effective?

Does the 5.850-5.895 MHz portion of the band potentially offer the most value for unlicensed operations?<sup>41</sup> What are the advantages and disadvantages of combining the non-safety-related channels into larger channels?<sup>42</sup> How should portions of the band not required for safety-of-life applications be shared among DSRC and unlicensed operations? For instance, should non-safety of life DSRC applications share the lower re-channelized band on an equal basis with unlicensed operators or have some priority? If commercial or other non-safety DSRC applications have priority access to the band, is a detect-and-vacate protocol necessary or does the IEEE 802.11 standard or other protocols allow for prioritization of DSRC traffic without the need to vacate non-safety channels for a pre-determined time period?

In addition, we invite interested parties to suggest other approaches that would facilitate unlicensed use of the 5.850-5.925 GHz band without causing harmful interference to DSRC operations. Would a hybrid approach taking elements from both the “detect and avoid” and the “re-channelization” proposals create benefits for both DSRC and U-NII users?<sup>43</sup> For example, are there advantages to an approach where unlicensed users and DSRC non-safety of life applications would share access to the lower 45 megahertz of DSRC spectrum, while unlicensed devices would use a “detect and avoid” approach to avoid, and thus protect, co-channel safety-of-life DSRC operations in the upper 30 megahertz of spectrum?<sup>44</sup> Is it feasible to develop a “hybrid chip” that would implement a DSRC standard receiver for detection purposes to allow unlicensed use, if the spectrum is clear? Would it be viable to employ an approach based on use of a database to control access to the spectrum similar to that used for the Citizens Broadband Band Radio Service at 3.5 GHz or for White Space devices in the TV and 600 MHz Service bands?<sup>45</sup> We ask parties to propose mitigation techniques with adequate specificity and detail so that we

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<sup>41</sup> Letter from Alliance of Automobile Manufacturers, Association of Global Automakers, Cisco Systems, Inc., and DENSO International America Inc. to Marlene H. Dorch, Secretary, FCC at 3 (April 14, 2016) (discussing whether 5.895 GHz would be the upper boundary of the unlicensed portion of the band).

<sup>42</sup> *Id.* (discussing options under the re-channelization approach, such as 10 megahertz or 20 megahertz channels in the lower portion of the band).

<sup>43</sup> *See, e.g.*, Letter from Broadcom to Marlene H. Dorch, Secretary, FCC at 5-6 (May 5, 2016) (proposing exclusive DSRC safety-of-life operations from 5.895-5.925 GHz and a “detect and mitigate” approach for non-safety-of-life DSRC transmissions in the 5.850-5.895 GHz band, where the Wi-Fi device would adjust its access mechanisms to provide priority to DSRC transmissions).

<sup>44</sup> *See also* IEEE 802.11-13/1449r2, Proposal for UNII-4 band coexistence at 4 (Nov. 13, 2013), <https://mentor.ieee.org/802.11/dcn/13/11-13-1449-02-0reg-proposal-for-dsrc-band-coexistence.pptx> (proposing that U-NII devices use the entire 75 megahertz U-NII-4 block by implementing stricter protection criteria for the safety DSRC operations in the 5.895-5.925 GHz spectrum as compared to that used to protect non-safety DSRC operations in the 5.850-5.895 GHz spectrum).

<sup>45</sup> *See Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, Report and Order and Second Further Notice of Proposed Rulemaking, 30 FCC Rcd 3959, (continued....)



can compare and contrast them with the proposals already before us. In that regard, we seek comment on the viability of any new proposal, and benefits and costs of the suggested technique, and on any trade-offs related to the proposal.

We also invite comment on the ramifications of any of the sharing techniques relative to indoor as well as outdoor use. For instance, is re-channelization, detect and avoid, or a hybrid approach more or less likely to allow for unlicensed indoor and outdoor deployments? Do certain sharing techniques permit more or less indoor or outdoor unlicensed use in certain geographic areas? Are there technical parameters that could be put into place to obviate interference concerns and facilitate deployment of unlicensed networks in either indoor or outdoor environments? For example, would it be feasible to tie the use of lower power levels for indoor-only devices to a less rigorous DSRC detection method in those devices, leaving the more sensitive DSRC detection methods to higher power outdoor-only units? Is it reasonable to assume that indoor-only devices are less likely to cause interference to DSRC outdoors, thus allowing for less aggressive detection sensitivity? If so, what technical characteristics would be required? We seek a full record on this technique and its specification to assess whether it is possible to share the DSRC band in this manner.

### **Request for Prototypes**

As noted above, we recognize some development and testing has already occurred for 5.9 GHz devices. We invite parties to submit 5.9 GHz prototype unlicensed, interference-avoiding devices to the Commission for testing (subject to specifications and a deadline upon which we are requesting comment, as described below).<sup>46</sup> We also request that parties provide 5.9 GHz DSRC RSU and OBU equipment, against which we will test the prototype unlicensed, interference avoiding devices. In addition, we request comment on what date is reasonable for prototype submission, and what constitutes an acceptable prototype (*e.g.*, does the device need to be able to communicate with another device, or is it sufficient for the device to only demonstrate the sharing technique?). The deadline for submission of prototypes shall be July 30, 2016; however, we delegate the authority to OET to establish the submission requirements and grant waivers or extensions of the submission deadline or requirements, as necessary. Given the importance of this item, parties should explain in detail in any waiver or extension request why such request should be granted. Parties that would like to submit devices for testing should advise OET as soon as possible and should deliver their device at their earliest opportunity. To arrange delivery of a device, please contact Reza Biazaran at (301) 362- 3052 or reza.biazaran@fcc.gov.

### **FCC/DoT/NTIA Test Plan Collaboration**

While we await submission of acceptable prototypes, the Commission, in accordance with its spectrum management expertise, and in coordination with the DoT and NTIA, are devising an FCC test plan that complements, but remains independent of, the August 2015 DoT Test Plan, to further explore sharing the 5.850-5.925 GHz band with unlicensed devices. As currently envisioned, the test plan proposes collaborative testing in three phases:

(Continued from previous page) \_\_\_\_\_  
4048-69, paras. 301-78 (2015) (establishing a “Spectrum Access System” that serves as an automated frequency coordinator across the Citizens Broadband Radio Service in the 3.5 GHz band, protecting higher tier users from those beneath and optimizing frequency use to allow maximum capacity and coexistence for the band’s users); *Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, ET Docket Nos. 04-186 and 02-380, Second Report and Order and Memorandum Opinion and Order, 23 FCC Rcd 16807, 16877-85, paras. 201-24 (2008) (establishing a database plan to provide for management of broadcast licensee and unlicensed TV band device records and the identification of available channels for transmission by the unlicensed TV band devices).

<sup>46</sup> We note that this is consistent with testing efforts we performed in support of the TV White Spaces proceeding. *The Office of Engineering and Technology Announces Additional Testing of TV White Space Devices*, ET Docket No. 04-186, Public Notice, 22 FCC Rcd 18091 (OET Oct. 5, 2007).

- *Phase I:* The first phase will involve testing at the FCC Laboratory in Columbia, Maryland, to determine the technical characteristics of prototype unlicensed devices and how they are designed to avoid causing harmful interference to DSRC. As part of the Phase I tests, the agencies will assess the devices' emission characteristics as well as parameters such as the threshold at which a U-NII device detects DSRC signals on a channel and the amount of time required for a device to vacate the channel so as to avoid interference for devices that will implement "detect and avoid" approaches.
- *Phase II:* The second phase will be based largely on Section 6 of the DoT Test Plan and will involve basic field tests with a few vehicles at a DoT facility. The Phase II tests will determine whether the techniques to avoid interference to DSRC that were evaluated in Phase I's lab tests are effective in the field.
- *Phase III:* The third phase will involve tests with many more vehicles, more test devices, and real-world scenarios at a suitable facility. Phase III tests may consider many of the elements discussed in Sections 4, 5, and 9 of the DoT Test Plan (*e.g.*, aggregate effects in dynamic environments).

We seek comment on the proposed Phase I test plan as set forth in the Attachment to this Public Notice. The Phase I test plan describes an approach and methodology to empirically determine interference tolerance and thresholds associated with the DSRC receive components of the V2V and V2I communication links relative to the introduction of U-NII emissions into the 5.850-5.925 GHz band, and to evaluate the effectiveness and reliability of any U-NII device interference mitigation capabilities. Since U-NII represents an unlicensed application for which any interference received from the operation of an authorized radio service must be accepted,<sup>47</sup> the test plan does not assess the interference potential from DSRC transmissions to projected U-NII receivers. To the extent possible and reasonable, the test effort will utilize the results and recommendations from DoT's previous efforts. The data resulting from the Commission's tests are intended to inform the Phase II and Phase III analyses in which other relevant factors can be given further consideration, and the analytical results can be validated through limited field tests similar to those described in Section 6.0 of the DoT Test Plan.

The three phases of the test plan are interdependent. We anticipate that all three phases of the test plan will be completed before reaching any conclusions as to how unlicensed devices can safely operate in the 5.850-5.925 GHz band. The Commission, however, expects that this testing will be concluded and submitted no later than January 15, 2017. Do stakeholders believe that this is sufficient time to submit prototypes? Given the importance of this item, parties should explain in detail why any additional time should be allocated. Engineers from the FCC will carefully examine the options and mechanisms for sharing in the 5.850-5.925 GHz band and closely scrutinize the myriad interference prevention approaches. The FCC, in consultation with the DoT and NTIA, will continue to collaborate, as well as engage with other stakeholders, and may make adjustments to the plan as it evolves.

Our goal is to collect the relevant empirical data for use in analyzing and quantifying the interference potential introduced to DSRC receivers from unlicensed transmitters operating simultaneously in the 5.850-5.925 GHz band. We anticipate that the tests conducted to date, combined with the results of the three-phase test plan described above, will provide reliable, real-world data on the performance of unlicensed devices designed to avoid interfering with DSRC operations in the 5.850-5.925 GHz band.

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<sup>47</sup> 47 CFR § 15.5(b).

## Procedural Matters

### A. *Ex Parte* Rules

This proceeding has been designated as a “permit-but-disclose” proceeding in accordance with the Commission’s *ex parte* rules.<sup>48</sup> Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter’s written comments, memoranda or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with rule 1.1206(b). In proceedings governed by rule 1.49(f) or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (*e.g.*, .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission’s *ex parte* rules.

### B. Filing Requirements

Comments are due on or before 30 days after date of publication in the Federal Register, and reply comments are due on or before 45 days after date of publications in the Federal Register. All filings must refer to ET Docket No. 13-49.

Pursuant to sections 1.415 and 1.419 of the Commission’s rules, 47 CFR §§ 1.415, 1.419, interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Comments may be filed using the Commission’s Electronic Comment Filing System (ECFS). *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the ECFS: <http://fjallfoss.fcc.gov/ecfs2/>.
- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.

Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission’s Secretary, Office of the Secretary, Federal Communications Commission.

- All hand-delivered or messenger-delivered paper filings for the Commission’s Secretary must be delivered to FCC Headquarters at 445 12<sup>th</sup> St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743.

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<sup>48</sup> 47 CFR §§ 1.1200 *et seq.*

- U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12<sup>th</sup> Street, SW, Washington DC 20554.

People with Disabilities: To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to [fcc504@fcc.gov](mailto:fcc504@fcc.gov) or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (tty).

For further information, contact Howard Griboff, Office of Engineering and Technology, (202) 418-0657.

#### **C. Initial Regulatory Flexibility Analysis**

The *NPRM* included an Initial Regulatory Flexibility Analysis (IRFA).<sup>49</sup> That IRFA invited comment “on making available an additional 195 megahertz of spectrum in the 5.35-5.47 GHz and 5.85-5.925 GHz bands for U-NII use.” This Public Notice seeks further comment on some of the proposals initially raised in the *NPRM* and alternative proposals submitted into the record of this proceeding. We request supplemental comments on the IRFA in light of the details and issues raised in this Public Notice. These comments must be filed in accordance with the same filing deadlines as comments filed in response to this Public Notice as set forth on the first page of this document and have a separate and distinct heading designating them as responses to the IRFA.

#### **D. Paperwork Reduction Act Analysis**

The *NPRM* included a separate request for comment from the general public and the Office of Management and Budget on the information collection requirements contained therein, as required by the Paperwork Reduction Act of 1995, Public Law 104-13, and the Small Business Paperwork Relief Act of 2002, Public Law 107-198.<sup>50</sup> As noted above, this Public Notice seeks further comment on some proposals and alternatives initially raised in the *NPRM*. We invite supplemental comment on these requirements in light of the details and issues raised in the Public Notice.

Action by the Commission on May 25, 2016: Commissioners Rosenworcel and O’Rielly issuing a joint statement; Commissioner Pai issuing a statement.

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<sup>49</sup> *NPRM*, 28 FCC Rcd at 1815-17, Appendix D.

<sup>50</sup> *Id.* at 1804-05, para. 120.

## ATTACHMENT

### **Draft Test Plan for Evaluating the Potential for Electromagnetic Compatibility (EMC) Between Unlicensed National Information and Infrastructure (U-NII) Devices and Dedicated Short Range Communications (DSRC) Operations Associated with the Intelligent Transportation System (ITS) Under Proposal to Share the 5.9 GHz Frequency Band - Phase I Test Effort**

The DSRC test plan is comprised of three phases. This document addresses technical characterization efforts in phase I.

#### **1.0 Introduction**

##### **1.1 Objective**

The objective of this test effort is to collect the data necessary to establish interference thresholds associated with key performance parameters that can then be used in subsequent scenario-based analyses to better assess the interference potential to DSRC operations that might be introduced from sharing the frequency band with unlicensed (U-NII) devices. In addition, any interference mitigation capabilities provided by the U-NII prototype test samples will be evaluated for viability, efficiency, and reliability.

##### **1.2 Approach**

It is recognized that the electromagnetic compatibility (EMC) concerns introduced by the proposal to share the DSRC frequency band with unlicensed operations are complex, primarily due to the dynamic variabilities associated with each system under consideration. For example, U-NII applications are predominately utilized to establish local area networks (LANs), typically in support of Wi-Fi access and usage, although fixed point-to-point communication links for supporting Internet backhaul applications are also likely. While the access points associated with LAN applications are typically relatively fixed in terms of location, the client devices that communicate with them can be quite mobile. Similarly, the DSRC RSU's (roadside units) are typically sited at fixed locations along roadways, but the OBU's (on-board units) that communicate with the RSU's and with other OBU's are vehicle-mounted and thus can involve high-velocity dynamic mobility. As such, it will be impractical to examine each and every potential interaction involving U-NII transmissions relative to DSRC receivers in either an empirical or analytical effort. Therefore, the approach proposed in this test plan represents an attempt to contain the myriad of variable conditions within a space bounded between "best case" (no interference) and "worst case" (maximum interference) conditions. Subsequent analytical efforts can then introduce appropriate scenario-based considerations, and examine associated subtleties such as the probability of occurrence and the maximum duration of potential interference interactions.

In an effort to deal with these complexities, the examination of compatibility between proposed U-NII transmitters and DSRC receivers sharing the same frequency band will employ a phased approach, with the various interested agencies (*i.e.*, FCC, NTIA, and DoT) collaborating in each distinct test phase. Each successive phase of the study will progressively consider additional interference interaction variabilities. The first phase of this effort will be performed at the FCC Laboratory in Columbia, Maryland and will involve bench tests in a laboratory environment assuming static conditions (*i.e.*, vehicle dynamics not considered). It is envisioned that the Phase II effort will utilize the Phase I data to support analytical efforts to assess compatibility under scenario-specific conditions and will also include some result verification through limited scenario-based field tests. The final phase (Phase III) of the study is envisioned to utilize the Phase II results, adjusted accordingly based on the verification test observations, to expand the field testing under "real world" conditions such as those proposed in Section 6.0 of the DoT Test Plan.

This test plan primarily describes the proposed Phase I effort of this study, to be performed by FCC engineers at its laboratory facility in Columbia, MD, with the support of DoT engineers.

## **2.0 Phase I Test Proposals**

### **2.1 Potential Interference Mechanisms**

It is anticipated that the likely interference mechanisms associated with sharing the DSRC frequency band are: 1) a potential for degrading the DSRC receiver noise floor, and thus, the link signal-to-noise ratio (SNR) due to additive noise-like interference introduced by proposed U-NII devices; 2) a potential for corruption of received data packets due to introduced interference, resulting in an increased packet error rate (PER) and/or reduced data throughput; 3) a potential for channel access contention, resulting in an increase in the time required for DSRC channel access; and 4) a potential for receiver saturation or overload due to short-range, co-tuned interactions. These represent the potential interference mechanisms and associated metrics that will be examined as a part of this proposed Phase I test effort.

### **2.2 Potential Interference Mitigation Techniques**

Several possible techniques and strategies have been proposed for mitigating interference interactions between projected U-NII transmitters and DSRC receivers. The IEEE Tiger Team explored two possible options: 1) the use of the existing DSRC channel plan with a clear channel assessment (CCA) capability specified for U-NII transmissions in the 10-MHz DSRC channels, and 2) the adoption of a modified DSRC channel plan (*i.e.*, bi-furcation of the DSRC frequency band) with a CCA capability specified in 20-MHz channels. The NTIA 5 GHz Report proposed more general mitigation strategies, such as several possible detection methodologies for use in implementing a CCA capability (*e.g.*, energy, matched filter, and signal detection), and a geo-location/database mitigation approach. The NTIA 5 GHz Report also identifies some of the potential inadequacies associated with each of these potential interference mitigation approaches.

The 802.11 standard under which U-NII operates currently provides for two methods of implementing a CCA capability. The first method, known as Carrier Sensing (CS), involves a determination of channel availability through the detection (reception) and decoding of the preamble of a data packet transmitted by the current channel occupant. Most 802.11 U-NII devices utilize the same basic CS technique, known as Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA). The FCC does not specify nor regulate CS requirements for U-NII devices. The second CCA method specified in the 802.11 standard is known as Dynamic Frequency Selection (DFS) where a U-NII device must identify an occupied channel through the detection of the channel occupants radio-frequency (RF) energy levels relative to an established threshold value (*i.e.*, Energy Detection (ED)), without regard to signal structure specifics. This technique is required for U-NII devices that share other portions of the 5 GHz spectrum in order to preclude interference to critical Government Radar operations. DFS requirements and compliance tests were developed cooperatively between FCC, NTIA and DoD, and are enforced by the FCC.

Since U-NII device access to the spectrum is on a non-interference basis (NIB), DSRC must be accorded primacy in any channel access protocol. Such access prioritization will also likely be required for all of the seven 10-MHz channels that are assigned to DSRC. Thus, to ensure DSRC preferential access, a U-NII device must be capable of detecting an access-contending DSRC signal at energy levels that are equal to, or below, the DSRC receiver sensitivity level on each of the seven DSRC channels.

As a primary element of this Phase I effort, the FCC will perform benchtop measurements of those prototype U-NII devices submitted for testing that implement these, or other not yet proposed, interference mitigation capabilities. The actual tests to be performed will be tailored to the particular mitigation strategy employed, and will be designed to ensure the effectiveness and reliability associated with the detection and recognition of DSRC-occupied channels.



## 2.3 General Test Approach

It is not possible to design a detailed comprehensive plan for testing all of the components identified for examination in the Phase I test program until we have access to U-NII devices designed for operation in the 5.9 GHz frequency band and DSRC RSU and OBU equipment to test against. Therefore, what is proposed below represents a general plan for achieving the identified objectives. This plan will be adapted as necessary once more details of the devices to be tested are made available.

The first step in the Phase I effort is to solicit the devices necessary to implement the test plan, as the Commission does in this Public Notice. The FCC requests that industry provide prototype U-NII devices projected for operation in the 5.9 GHz frequency band, to include interference mitigation capabilities, for test and evaluation. The FCC, working cooperatively with NTIA and DoT, also request that the DSRC equipment necessary to exercise this test plan be provided. In addition, technical support must be made available to assist in configuring the devices for testing and in accessing the requisite device control and resulting data. All of the devices will be required to have appropriate software controls to perform the tests under a controlled environment.

As devices are submitted to the FCC laboratory as test samples, they will first be technically characterized through the measurement of standard RF parameters such as the occupied bandwidth (OBW), fundamental power, and unwanted emission levels associated with the transmitted signals, and the sensitivity and noise floor levels associated with the receivers. The measured parameters will be compared with appropriate specifications (*e.g.*, IEEE 802.11ac, IEEE 802.11p, ASTM E2213, FCC regulations, and other applicable rules and standards).

Once the characterization measurements are complete, DSRC links will be established to simulate simple RSU-to-OBU and OBU-to-OBU two-way wireless communication. Upon successful establishment of such communication links, and before any interference signals are introduced, measurements will be performed to establish base-line values for parameters such as SNR (signal-to-noise ratio), PER (packet error rate), network delay and the variance in network delay (also known as jitter).

After the completion of baseline testing, a single U-NII signal, or simulation thereof (*e.g.*, band-limited additive white Gaussian noise (AWGN)), will be introduced on a co-tuned basis (*i.e.*, with coincident center frequencies) initially at a very low power level. The U-NII power level will then be incremented (1-3 dB steps) while the designated performance parameters are monitored and recorded. The results of this test will provide the data necessary to determine the DSRC tolerance to U-NII interference in a “worst-case” interference interaction (*i.e.*, co-tuned operation). It is recognized that U-NII transmitters, particularly those used to provide Wi-Fi services, can utilize variable OBW’s (occupied bandwidths) and are capable of implementing several combinations of data modulation and coding rate (Modulation-Coding Scheme or MCS) on a variable basis, depending on the transmission channel conditions. FCC experience gained from developing and instituting compliance measurement of U-NII transmissions suggest that there are only subtle differences in the relevant signal parameters among these combinations; however, measurements will be performed using different combinations of these variable parameters in an effort to identify a “worst-case” mode and to quantify the differential magnitude of the effect on a DSRC receiver.

The procedure described above will then be repeated with the U-NII transmit signal re-tuned to the center frequency of each of the two adjacent DSRC channels relative to the DSRC-occupied channel (*i.e.*, upper and lower first adjacent channels). This measurement will produce data that can be used to determine the adjacent-channel rejection capability of a DSRC receiver which in turn can be used to inform an assessment of EMC assuming adjacent-channel operation. Dependent upon the results of this test and time constraints, this process may be repeated with the U-NII device tuned to DSRC channels further removed (in frequency) from the DSRC-occupied channel (*i.e.*, second adjacent channel interaction).

Once these tests are complete, the potential effects of network loading (LAN and DSRC) and interference aggregation will be examined by the addition of supplementary DSCR links and U-NII devices to the test configuration as the availability of devices permit.

Similar procedures, with modifications based on the protocols implemented by the prototype U-NII sample devices, will be used to evaluate the effectiveness and reliability of any interference mitigation capabilities (*e.g.*, DSRC signal detection methods, Clear Channel Assessment capability of U-NII devices, and other mitigation methods not yet defined).

### **3.0 Summary**

The plan presented herein represents a “high-level” approach to the Phase I testing intended to acquire the empirical data necessary to further an examination of the potential for achieving EMC between U-NII devices and DSRC operations under the FCC proposal to share the 5.9 GHz frequency band. The proposed test procedures and methodologies will be further refined as more information becomes available with respect to the U-NII and DSRC devices anticipated to share this spectrum. The FCC requests relevant technical input in the form of comments from other concerned parties in the interest of enhancing and/or improving this test plan proposal.

**JOINT STATEMENT OF  
COMMISSIONERS JESSICA ROSENWORCEL AND MICHAEL O'RIELLY**

*Re: The Commission Seeks to Update and Refresh the Record in the "Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band" Proceeding, ET Docket No. 13-49, Public Notice.*

For more than three years, there has been discussion and debate about unlicensed use in what is known as the 5.9 GHz band. We believe this slice of spectrum provides the best near-term opportunity for promoting innovation and expanding current offerings, such as Wi-Fi. That's because combining the airwaves in this band with those already available for unlicensed use nearby could mean increased capacity, reduced congestion, and higher speeds.

This is an effort worth pursuing—and today's action is the appropriate and necessary next step. This Public Notice puts in place a framework to demonstrate that unlicensed use in the 5.9 GHz band is possible without causing harmful interference to incumbent licensees, and in particular to Dedicated Short Range Communications (DSRC) systems. It establishes procedures for the submission of prototypes for testing and a test plan that will be led by the Commission, in consultation with the Department of Transportation and National Telecommunications and Information Administration. Specifically, we refresh our record in part to obtain further information about the two 5.9 GHz spectrum sharing technologies offered to date—by Qualcomm and Cisco. We look forward to the record that develops.

To speed this process along, today's Public Notice also adopts a July 30, 2016 deadline for the submission of testing equipment and commits to complete testing by January 15, 2017. Both deadlines are important. They provide much-needed certainty for the unlicensed community and car manufacturers.

It has been nearly 17 years since the Commission allocated 5.9 GHz spectrum for DSRC, which long ago promised technologies that would prevent automobile collisions and help make our roads safer. These are laudable and noble goals. We appreciate that work on DSRC is still underway and are hopeful that this technology comes to fruition, but, in the intervening years since this spectrum was set aside for this purpose, there have been enormous changes in technology. Connected cars are using a range of wireless technologies to provide safety functions, and autonomous vehicles are on their way. Meanwhile, technological advances have reduced the potential for interference and enabled spectrum sharing, allowing us to explore unlicensed opportunities in this band without causing harmful interference to DSRC safety-of-life functions. This pursuit is the best means to ensure the most effective and efficient use of the 5.9 GHz band.

We thank the Chairman for incorporating our edits in this Public Notice. In particular, we are pleased that it now requests more information about the current status of DSRC development, anticipated DSRC uses and spectrum needs, how to define safety-of-life applications, and the treatment of non-safety-of-life functions, among others. In addition, we are pleased that at long last we have a schedule for testing. Finally, thanks to the Office of Engineering and Technology for its efforts getting us to this point and for the work ahead.

**STATEMENT OF  
COMMISSIONER AJIT PAI**

Re: *The Commission Seeks to Update and Refresh the Record in the “Unlicensed National Information Infrastructure (U-NII) Devices in the 5GHz Band” Proceeding*, ET Docket No. 13-49.

Since 2012, I have been calling on the FCC to open up more of the 5 GHz band for unlicensed use.<sup>1</sup> That’s because this spectrum is tailor-made for the next generation of high-speed, wireless broadband. Making available more spectrum in the band will mean more robust and ubiquitous wireless coverage for consumers, more manageable networks for providers, more test beds for innovative application developers, and other benefits we can’t even of conceive today. So I was pleased when Chairman Genachowski agreed to launch this proceeding back in 2013.<sup>2</sup>

Unfortunately, the proceeding then lay dormant for two years.

That didn’t sit well with some. Thankfully, a large number of federal officials, including Senators John Thune, Bill Nelson, Cory A. Booker, Claire McCaskill, Gary C. Peters, and Marco Rubio,<sup>3</sup> Representatives Bob Latta<sup>4</sup> and Anna Eshoo,<sup>5</sup> and Commissioners Michael O’Rielly and Jessica Rosenworcel,<sup>6</sup> raised a bipartisan chorus for the FCC to get this proceeding moving again. And now we have a path forward.

I am pleased that the agency is putting all options on the table. As we enter what will hopefully be the final stretch of this proceeding, we need to do so with open minds. The FCC allocated this spectrum for Dedicated Short Range Communications (DSRC) operations at the end of the last century. DSRC is intended to enable wireless communications to promote safety for both vehicle-to-vehicle and vehicle-to-infrastructure purposes. But at the time of the allocation, we did not have the commercial applications or new radar technologies that can play a key role in improving highway safety and thus saving lives.

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<sup>1</sup> See, e.g., Remarks of Commissioner Ajit Pai at CTIA’s MobileCon (Oct. 10, 2012), <http://go.usa.gov/4tkA>; see also Statement of Ajit Pai, Commissioner, Federal Communications Commission, Hearing before the Subcommittee on Communications and Technology of the U.S. House of Representatives Committee on Energy and Commerce (Dec. 12, 2012), <http://go.usa.gov/4t8Q>.

<sup>2</sup> *Revision of Part 15 of the Commission’s Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, ET Docket No. 13-49, Notice of Proposed Rulemaking, 28 FCC Rcd 1769 (2013).

<sup>3</sup> Letter from Senators John Thune, Cory A. Booker, and Marco Rubio to Anthony Foxx, Secretary, U.S. Department of Transportation, Penny Pritzker, Secretary, U.S. Department of Commerce, and Tom Wheeler, Chairman, FCC (Sept. 9, 2015); Letter from Senators Bill Nelson, Claire McCaskill, and Gary C. Peters to Anthony Foxx, Secretary, U.S. Department of Transportation, Penny Pritzker, Secretary, U.S. Department of Commerce, and Tom Wheeler, Chairman, FCC (Sept. 10, 2015).

<sup>4</sup> Press Release, *Latta on 5.9 GHz Band Testing For Greater Unlicensed Use* (Jan. 14, 2016), <http://go.usa.gov/cSD63>.

<sup>5</sup> Representative Anna Eshoo and Commissioner Ajit Pai, *The Feds Have to Act to Get America Faster Wi-Fi*, Wired (Feb. 7, 2016), <http://www.wired.com/2016/02/the-feds-have-to-act-to-get-america-faster-wi-fi/>.

<sup>6</sup> See, e.g., Commissioners Michael O’Rielly and Jessica Rosenworcel, *Driving Wi-Fi Ahead: the Upper 5 GHz Band* (Feb. 23, 2015), <https://www.fcc.gov/news-events/blog/2015/02/23/driving-wi-fi-ahead-upper-5-ghz-band>.

My hope is that we make a smart decision quickly—both in this spectrum band and in the lower, 120 MHz of the 5 GHz band—to allow this spectrum to directly benefit consumers. I look forward to working with my colleagues on doing just that.